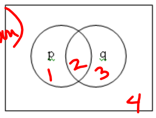
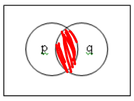
2-2 Logic Continued

Venn Diagrams

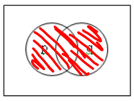
Venn Diagrams
∧-- AND (intersection)
∨-- OR (union)



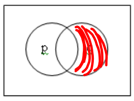
p ∧ q
1 2 2 3



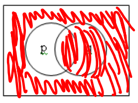
p ∨ q
1 2 2 3



~p ∧ q
3,4 2,3



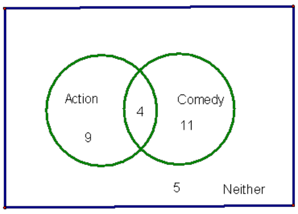
~p ∨ q
3,4 2,3



and – have in common
or – everything

Use the Venn diagram to answer the following questions.

Jack surveyed the students in his science class to find out what movies they ~~preferred~~. like



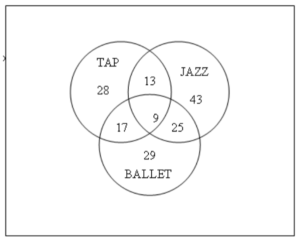
1. 29 How many students were surveyed? 9+4+11+5

2. 13 How many students preferred Action? 9+4

3. 4 How many students preferred Action and Comedy?

4. 14 How many students did not prefer comedy? 9+5

Use the following Venn diagram about dance classes to answer the questions.



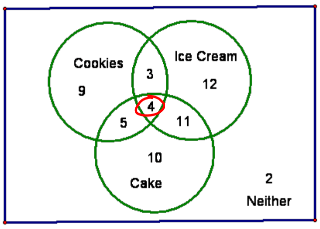
1. 9 How many students are in tap, jazz, and ballet?

2. 121 How many are in tap or ballet? 28+13+17+9+25+29

3. 25 How many are in jazz and ballet and not tap?

4. 34 How many are in jazz and ballet? 25+9

Use the following Venn diagram about dessert preferences to answer the questions.



1. 56 How many people were surveyed?
2. 21 How many people preferred cookies? 9+3+4+5
3. 9 How many people preferred cookies and cake? 4+5
4. 26 How many people did not prefer ice cream? 9+5+2+10
5. 45 How many people preferred cake or ice cream? 5+4+11+10+3+12
6. 4 How many people preferred cookies and cake and ice cream?

2-3 Conditional Statements

Conditional statements are statements written in the *if, then* form.

If p, then q. p-hypothesis q-conclusion

$p \rightarrow q$ "if p, then q" or "p implies q"

Examples:

If Cinderella completes her chores, then she can go to the ball.

If an angle is a right angle, then it measures 90°.

If a polygon has exactly 6 sides, then it is a hexagon.

Examples:

All squares are rectangles.

If it is a square, then it is a rectangle.

All cats are animals.

If it is a cat, then it is an animal.

Related conditionals

Conditional	$p \rightarrow q$	If p, then q
Converse	$q \rightarrow p$	If q, then p.
Inverse	$\sim p \rightarrow \sim q$	If not p, then not q.
Contrapositive	$\sim q \rightarrow \sim p$	If not q, then not p.

If a conditional is true, then the contrapositive must also be true. They are said to be logically equivalent. The same is true for the converse and the inverse.

Example: Put the following statement into the if, then form. Write each related conditional. Determine whether it is True or False. If false, provide a counterexample.

Example:

All birds are owls.

Conditional: False (flamingo)

If it is a bird, then it is an owl.

Converse:

If it is an owl, then it is a bird. True

Inverse:

If it is not a bird, then it is not an owl. True

Contrapositive:

If it is not an owl, then it is not a bird. False (ostrich)

Example: Write each related conditional. Determine whether it is True or False. If false, provide a counterexample.

If two angles form a linear pair, then they are adjacent angles. T

Converse: If 2 $\angle$s are adjacent $\angle$s, then they form a linear pair. F

Inverse: If 2 $\angle$s do not form a Lin pair, then they are not adj. $\angle$s. F

Contrapositive: If 2 $\angle$s are not adj $\angle$s, then they do not form a Lin. pair. True

MODIFIED
p72-73 #s 15-17, 41-44,51
p78-79 #s 17, 23, 25, 43

~~Assignment: p. 72-73 #s 15-17, 41-47, 51~~
~~p. 78-79 #s 16, 17, 23, 25, 26, 34-39, 43~~